



USAID
FROM THE AMERICAN PEOPLE

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Latin America
Farmer-to-Farmer Program
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Executive Summary

At program start in 2003, Central America's farmers and agribusinesses faced three primary challenges: high rates of rural poverty and inequality, low prices for key commodities such as coffee and sugar, and opportunities and threats posed by economic integration and the US-Central American Free Trade Agreement (CAFTA-DR).

Based on these challenges and USAID's regional strategy, the goal of the Latin America Farmer-to-Farmer (LA FTF) Program implemented by Winrock International and Florida International University (FIU) was to increase rural prosperity and promote trade-led economic growth in Nicaragua, Guatemala, Honduras, and El Salvador. This goal was addressed through three program objectives:

1. Help *farm producers* to increase competitiveness, upgrade production capacity and quality, and prepare for liberalized trade opportunities and risks.
2. Enhance the competitiveness of *agribusiness firms and producer organizations* to serve domestic markets and exploit trade opportunities.
3. Expand market linkages and domestic and international public and private sector *alliances* for trade capacity building and leveraging resources.

At the beginning of the program, Winrock and FIU proposed the following key performance targets:

- Field 326 volunteer experts
- Improve seven agricultural subsectors
- Strengthen the capacity of 21,000 producers, processors, and other agribusiness entrepreneurs to sustainably operate in a liberalized trade environment
- Strengthen the capacity of 58 producer organizations and other agribusiness trade groups
- Facilitate 225 new business transactions (new contracts, orders, and joint ventures) and
- Facilitate gross sales increase of at least US\$3.8 million for FTF hosts and beneficiaries (cumulative over the life of project)

As of September 2008, 326 US volunteer trips strengthened 150 host organizations in 11 focus subsectors. Hosts have reported 158 new contracts, orders, and joint ventures and US\$75 million in increased gross sales over the life of project. More than 18,700 women and men participated in LA FTF activities, increasing their capacity to operate in a liberalized trade environment and adopting more sustainable farming and processing practices.

To widely disseminate technical and management innovations, LA FTF staff and volunteers collaborated with national agriculture and trade institutions, such as COEXPORT and FUSADES in El Salvador, AGEXPORT in Guatemala, FENAGH and FUNDER in Honduras, and the Dairy Chamber in Nicaragua.

As the FTF Program closes, Central America faces new challenges posed by rising food and energy prices and a global economic downturn. However, FTF beneficiaries have increased their productivity and efficiency and established new business and market alliances, and thus are better prepared to face the continuing challenges to poverty reduction and food security.

Overview of Experience

The Latin America Farmer-to-Farmer (LA FTF) Program goal was to increase rural prosperity and promote trade-led economic growth in Nicaragua, Guatemala, Honduras, and El Salvador. LA FTF also fielded a small number of volunteers to the non-core countries of Bolivia and Peru at the request of local partners. The FTF Program goal was achieved through three objectives:

1. Help *farm producers* to increase competitiveness, upgrade production capacity and quality and prepare for liberalized trade opportunities and risks.
2. Enhance the competitiveness of *agribusiness firms and producer organizations* to serve domestic markets and exploit trade opportunities.
3. Expand market linkages and domestic and international public and private sector *alliances* for trade capacity building and leveraging resources.

LA FTF did not experience any major modifications or obstacles with funding, program targets, or host country environment. By linking the program design closely to USAID's Central America and Mexico (CAM) regional strategy, FTF volunteers worked in high-priority topics and received excellent host country support and strong interest from local producers, agribusinesses, and government representatives.

During the life of project, Winrock dropped one focus area—tree crops in Nicaragua. After a year of implementation, we found the demand in this subsector was low, so we reprogrammed the tree crop assignments to dairy and horticulture.

LA FTF was fortunate to operate in a period of relative political stability in Central America. Field staff scheduled volunteer assignments to avoid short-term turmoil, such as the sometimes violent public protests associated with the presidential elections. The November 2006 elections in Nicaragua had a longer-term impact on FTF's ability to field volunteers. From October to December 2006, volunteer trips were put on hold due to concerns regarding political unrest associated with the elections. However, even after the elections several FTF hosts postponed or cancelled planned assignments as they waited to see how the new government's policies affected their operations. As a result, LA FTF reallocated volunteer targets, increasing the number of planned volunteers to El Salvador and Honduras and decreasing the number planned for Nicaragua.

Central America also experienced several hurricanes, tropical storms, a volcanic eruption, flooding, and landslides over the past five years. LA FTF was able to achieve its overall performance targets, despite all of these natural disasters, which caused several volunteer assignments to be rescheduled and shortened.

More importantly, technologies promoted by FTF volunteers help local producers reduce the risks from natural disasters and climate change. For example, FTF promoted greenhouse production of vegetables and ornamentals, which decreased crop losses from too much and too little rain. Furthermore, by decreasing production costs and increasing product quality, FTF hosts increased profits, which provided savings that can be used to rebuild and replant after a natural disaster.

From Natural Disaster to Business Opportunity

In 2005 FTF and our local partner FIAGRO worked with a new farmers association producing strawberries as a diversification strategy in the western coffee-growing region of El Salvador. Later that year, the association members lost their strawberry crop when the fields were burned by hot ashes from the Santa Ana volcanic eruption. At the time of the disaster, the farmers were selling about US\$1,500 per week of strawberries. The association's members reported roughly US\$500,000 in production and crop investment loss.



Picture of the Santa Ana volcano ash eruption in 2005

The FTF volunteer had recommended that the growers consider planting different strawberry varieties that were “day neutral,” such as the Chandler strawberry, to produce fruit several times over the growing season. He explained that this would maximize the returns to labor for planting.



Damage to El Salvador's strawberry crops following Santa Ana eruption in 2005

Following the eruption, the association, lead by the FTF host, experimented by changing to the Chandler and Camarosa varieties of strawberries. The results have been excellent. Three years later, the association reports 27 active members producing up to 2,800 pounds per week, at a price of US\$1.25 to 1.50/pound for about US\$3,500/week. Today, their strawberries are sold at local markets under the brand, *Monteciel*, and they have contracts with restaurants, bakeries, and supermarkets in San Salvador.

Summary of Major Outputs and Accomplishments

Summary of EGAT Indicator Tables

Between 2003 and 2008, the LA FTF Program completed 326 volunteer trips, 269 male (83%) and 57 female (17%). Florida International University (FIU), a Hispanic minority serving institution, recruited 160 of these volunteers. One third of all volunteers were from two states—Florida (67 volunteer trips) and California (46 volunteer trips). This concentration reflects Winrock and FIU's focus on recruiting volunteers for vegetables and tropical fruits in particular. Seventy of the volunteer trips were completed by Hispanic Americans. One hundred volunteers had moderate-to-fluent Spanish language skills. The volunteers completed a total of 4,996 volunteer days during their assignments (an average of 15.3 days per assignment). Furthermore, nine experts paid their own expenses to complete additional volunteer assignments with their hosts. These nine trips are not counted in the EGAT indicator tables or this narrative.

The total value of the FTF volunteers' professional time is estimated to be US\$1.99 million and volunteers leveraged US\$30,000 in additional resources from the United States. These resources include food processing equipment and supplies, books, and other extension materials.

Nearly two-thirds of all assignments (198) focused on technology transfer, 91 on business/enterprise development, 20 on organizational development, 11 on environmental conservation, and six on financial services. FTF work targeted different stages of the value chain, including 111 assignments addressing on-farm production, 83 assignments on support services, 60 on processing, and 72 on marketing.

LA FTF worked with a wide range of hosts, including 69 cooperatives and associations, eight individual private farmers, 23 other private enterprises, 28 NGOs, 10 education institutions, three financial institutions, and nine public sector technical agencies. The low number of individual (non-associated) farmers reflects FTF's focus on strengthening groups of producers as well as agribusiness and trade support institutions. FTF hosts mobilized US\$864,000 in resources, such as credit and grants, to strengthen their operations. The estimated value of host cost-sharing is US\$301,000.

LA FTF volunteers worked directly with 18,748 people (an average of 58 direct beneficiaries per volunteer trip). Approximately 25% of beneficiaries were female. An estimated 307,000 people were indirect beneficiaries of FTF activities; indirect beneficiaries primarily included other members and clients of the associations, cooperatives, and NGOs strengthened by FTF.

Major Overall Successes and Breakthroughs

LA FTF strengthened high-value subsectors, such as horticulture, tree crops, and forest products. We also worked in subsectors that employ a large percentage of rural producers and contribute to national food security, such as dairy. FTF volunteers helped the agricultural value chains grow and take advantage of opportunities offered by trade liberalization and rising middle class incomes.

Forty-five percent of all volunteer trips (146 assignments) targeted high-value horticultural production, processing, and marketing. In the horticulture subsector across the region, production (37%) and marketing (25%) were the main points of intervention in the value chains.

Furthermore the type of assistance was most often technology transfer. Processing became a greater focal point in the later years of the program.

FTF work in the forest and tree crop focus area included assignments in specialty and organic coffee, sustainable forestry, and tropical fruits such as mango and rambutan. Volunteers completed 64 tree crop and forest product assignments in Guatemala, Honduras, and Nicaragua. El Salvador completed another 12 assignments, which are classified as flexible, for a total of 76 volunteer trips (23% of all trips).

The dairy sector provides critical employment, income, and food security across Central America. Over the life of project, 68 assignments were completed by FTF volunteers in the dairy sector in El Salvador, Honduras, Nicaragua, Guatemala, and Peru. Similar market constraints affect dairy producers throughout the region such as milk quality, cattle health and nutrition, and hygienic milking practices. Furthermore, farmers lack information and record keeping skills, making it difficult to track production costs and net income. Working with local partners, FTF volunteers provided training and assistance on quality milk production. Volunteers helped farmers increase milk yields through improved animal genetics and nutrition.

In dairy processing, LA FTF worked with processors in Nicaragua (3 volunteer trips), El Salvador (12), and Honduras (1). The primary objectives of processing were to add value, extend shelf life, and eliminate the risk of pathogens. Most of the milk processed in Central America is handled in artisanal enterprises. LA FTF provided assistance to small- and medium-scale processors in technologies for liquid milk and milk products. Volunteers also trained local partners and processors in fermentation, cheese making, concentration and dehydration, quality control and developing a quality seal, and FDA certification. Volunteers worked on product diversification to develop new cheeses, yogurts, and whey products. LA FTF also fielded volunteers to evaluate the market potential for new dairy products along with packaging and price analysis. A total of nine assignments were completed in this area.

In El Salvador, Guatemala, Honduras, and Nicaragua, 50 assignments (15%) fell in the flexible category, including assignments in food processing and food safety, agribusiness development, export logistics and trade capacity building, aquaculture, and bioenergy. Volunteers also completed 16 assignments in Bolivia targeting the horticultural subsector, and five assignments in Peru working on horticulture and dairy value chains.

FTF volunteers were particularly successful at introducing affordable technologies that local partners are replicating with new groups of producers. For example, FTF volunteers designed and built two different low-cost greenhouse prototypes. Salvadoran partners are replicating these low-cost greenhouses to diversify low-altitude coffee farms. To date, hosts and partners have constructed 17 new greenhouses that made substantial increases in gross sales and net income to participating members.

Another volunteer to El Salvador helped design and build a hydroponic forage production system. In this system, hydroponic forage used 90% less water and cost US\$0.09 - \$0.13 per pound to produce, compared with US\$0.30 for commercial fodder. The USDA and TechnoServe have installed three more hydroponic forage systems, and another 20 modules will be constructed with support from FOMILENIO.

Another overall success was in strengthening hosts' and partners' market knowledge and capabilities. US volunteers helped to establish 158 new contracts, orders, and joint business ventures for products such as vegetables, tropical fruits, and specialty coffee. Hosts learned new skills in market analysis, buyer research, pricing, and contract negotiations. Several volunteers helped identify US buyers. For example, in Honduras, a 63-member cooperative organized a regional coffee tasting competition. In 2007, a Winrock volunteer completed an FTF assignment on coffee roasting and tasting. This volunteer is the lab manager and customer relations representative for Atlas Coffee Importers in Seattle. Last spring, he returned to Honduras at his own expense to serve as a tasting judge. He then bought 150 quintales of coffee (15,000 pounds) from the top five winners, paying \$30 per quintale above market price. Similarly, a volunteer, of Green Mountain Coffee Roasters, completed two LA FTF assignments, helping to link hosts to US buyers.

During the past four years, Florida International University offered a *USAID FTF Market Research* course in Miami. The course was well received by hosts as well as the students, who prepared market research reports for FTF hosts covering 82 products (for English copies of the reports, see <http://usaid.fiu.edu/mktresearch.htm>). In 2008, 30 students participated in the course. Students provided a detailed market analysis including the market characteristics, market access and requirements, prices, sales promotion, importers lists and distribution channels, and upcoming commercial events.

The following table summarizes key LA FTF results over the life of project.

Focus Areas and Summary of Key Performance Results

Country	Focus Area	# Vol Trips	# Producer Groups Strengthened Management	# Producers and Processors Upgraded Technologies and Product Quality	Cumulative LOP Gross Sales Increased (US\$)
El Salvador	dairy	17	13	2,110	9.3 million
El Salvador	horticulture	36	9	700	7.5 million
Guatemala	horticulture	40	12	2,871	4.3 million
Guatemala	tree crops	26	13	1,842	.5 million
Honduras	dairy	31	7	2,115	38.8 million
Honduras	horticulture	23	8	2,500	5.7 million
Honduras	tree crops	32	7	1,500	6 million
Nicaragua	dairy	18	8	1,800	3 million
Nicaragua	horticulture	31	9	2,000	.8 million

FTF Public Outreach

LA FTF employed host-country media to leverage resources and maximize the spread of FTF technical assistance. As an example, numerous El Salvador assignments received national television, radio, and newspaper coverage. More than 350,000 people learned about USAID's FTF activities. In some cases FTF partners organize a final volunteer presentation and print a public invitation in the local newspapers, resulting in hundreds of additional people hearing from the US volunteer. In Guatemala, two radio stations, *Sonora* and *Emisoras Unidas*, interviewed the FTF Country Manager on programs broadcast nationally. An estimated 200,000 people across the country listened to each radio broadcast. AGEXPORT's magazine, with a circulation of 10,000 people, published three articles about LA FTF. *Televiscentro*, the television channel in La

Ceiba and Comayagua, Honduras, covered FTF assignments. Nicaragua's national newspaper, *La Prensa*, also reported about FTF assignments. Local media outreach spreads technical information from FTF volunteers and staff, and it also supports USAID's goal to increase international understanding of the US and US development programs.

During the past five years, 112 returned volunteers also conducted outreach activities to inform the US public about the Farmer-to-Farmer Program, volunteerism, US foreign assistance, and international development. Over the life of project, returned volunteers conducted 97 media events and 102 group presentations. Additionally, FTF success stories are frequently highlighted in *Innovations*, a Winrock online publication sent to over 6,000 people. For example, when President Bush visited an FTF host in Guatemala, Winrock issued a special press release and e-mail news article to Winrock's distribution list. These outreach activities in local and international media highlight FTF's in-country technical assistance, as well as the cultural exchange that takes place between the volunteers and hosts.



Winrock e-card publicizing President Bush's visit to Guatemala FTF host

Summary of Work by Focus Areas

El Salvador

Horticulture and flexible assignments

Strategy

Vegetable and fruit subsectors offer significant opportunities for increased employment and incomes for rural residents. Vegetable consumption in El Salvador has grown from 3% in 2004 to 16% in 2006 (the most recent statistic available; valued at US\$30 million in 2006). National production is not sufficient to supply this increasing local demand; about 58% of vegetables consumed in El Salvador are imported. Consequently, farmers have significant opportunities to target local markets. Approximately 8,000 vegetable producers in El Salvador work on small plots ranging from 0.175 to 3.5 hectares that collectively cover 8,300 ha; 85% of fresh vegetables are sold in informal local markets.

A total of 6,650 ha divided among more than 3,500 growers are devoted to fruit tree production. Due to the insufficient supply of local fruit, many processors import fresh fruit or pulps from other countries. LA FTF supported the Government of El Salvador's FRUTAL-ES project to promote nostalgia¹ fruit production, allowing processors to source more raw products locally. Processed tropical fruits present a significant opportunity for export. The market demand of Salvadorans in the US is calculated to be between 207 and 377 containers of frozen fruit per year (valued at US\$1.9 million in 2007). There is also demand for processed fruit in local markets, especially from bakeries, supermarkets, hotels, and restaurants. Exports of local processed fruits have been increasing since 2004. In 2006, the Ministry of Agriculture reported a 47% increase of exports from the previous year, which amounts to an increase of US\$1.53 million per year.

El Salvador wholesale market pays higher prices than other regional markets (Honduras, Guatemala, Mexico, and Nicaragua). On the other hand, the cost of producing fruits and vegetables in El Salvador is higher than in neighboring countries. The majority of growers are "price takers" for their products because of their small share in total volume sold. To meet these challenges, LA FTF and its partners introduced innovative approaches such as value-added products and creation of niche markets.

Often times, small producers and businesses lack management capacity and marketing know-how, and experience high production costs. Another problem many encounter is difficulty satisfying quality standards. The subsector as a whole lacks technology, investment, and financing. Horticultural producers and processors often fail to meet food safety standards. Producers and processors must implement their own effective quality systems because there is almost no food safety enforcement.

Activities

In El Salvador's horticulture sector, LA FTF targeted greenhouse and improved production of vegetables such as tomatoes, green peppers, hot peppers, and cucumber. Volunteers improved

¹ Nostalgia products are the goods that are traditionally consumed by people in their home countries and that they would like to continue consuming abroad if they were available.

production, processing, and marketing of tropical tree fruits such as jocote, nance, anona, zapote, cashew, mamey, arrayán, níspero; annual fruit crops such as strawberry, pineapple, papaya, and watermelon; and ornamentals such as fresh cut flowers and foliage. Flexible volunteer assignments supported food industry development (e.g., food quality and shelf life), food laboratory analysis techniques, gourmet coffee, improved water use, and entrepreneurship training. After analyze value chain weaknesses, LA FTF and its partners targeted the following areas:

At the production level:

- building low-cost greenhouses for sustainable fresh vegetable production
- promoting quality genetic and phytosanitary plant reproduction
- adopting integrated pest management and good agricultural practices
- improving harvest and postharvest handling

At the processing level:

- developing new processed products to serve market requirements
- adopting good manufacturing practices (GMP)
- designing small processing plants that meet GMP requirements
- designing an export fruit certification system

At the business organization level:

- promoting innovative packaging materials
- developing strategic business plans for farmer associations and processors
- designing an informational system for tropical fruit markets

Results

Over the life of project, LA FTF fielded 55 volunteers for horticulture and flexible assignments. FTF strengthened the production, postharvest handling, and marketing capabilities of approximately 2,110 producers, including 15 coffee gourmet companies (representing private farms, farmer associations, and cooperatives), a flower and ornamental plant growers association, a strawberry producers association, tropical fruit producers and processors, papaya producers, pineapple producers, and beekeepers. As a result of FTF assistance, hosts and partners for horticulture and flexible assignments report a cumulative increase in gross sales of \$9.2 million over the past four years.

FTF aimed to bring targeted food producers up to GMP standards. To accomplish this goal, processors learned to use audit forms and perform self-inspection audits. Food safety measures were also implemented to create a more sanitary environment and safer, higher quality products. Along with providing a clear understanding of GMP, volunteers created unique products, such as jams, jellies, chutney, sauces, pickles, and syrups, for female-owned microenterprises. With the help of FTF volunteers, processors obtained food safety licenses, brands, attractive labels, nutritional facts, and bar codes. Volunteers taught processors the basic principles of packaging, labeling, cost analysis, and sales marketing. FTF hosts also learned how to reduce production time and use less energy. These improvements have opened up new markets and increased sales and profits. Following are examples of these accomplishments.

Volunteers introduced new technology, such as hydroponic tomato production and vegetable production in greenhouses. Producers learned pollination and pruning techniques, as well as weed and disease prevention and control. As a result of using greenhouses, farmers have safer

working conditions and hosts offer employment year-round for their employees. Volunteers helped improve crop and nutrient management and soil and water conservation.

Volunteers decreased the use of harmful pesticides, and introduced organic pesticides and fertilizers. As a result, producers have reduced production costs and improved producer and consumer safety. Volunteers helped install improved designs for vegetable irrigation systems. With improved irrigation and drainage, water use and plant diseases decreased.

Volunteers also helped improve business management. For example, one volunteer worked with a farmers association (representing 83 farmers and seven employees) to conduct a financial analysis. Together they analyzed prices and brainstormed ways to reduce costs. They developed a financial model and tools to track late payments by clients. The volunteer helped the producers to develop a business plan. Now the association management understands the importance of record keeping and the need to document procedures. As a result of this financial analysis, the farmers association has downsized to focus on serving its more profitable clients.

FTF assistance for improved plant and tree propagation is spreading throughout El Salvador's private and public sectors. After training provided by a volunteer, a private lab is using tissue culture to propagate commercial explants;² the lab owner implemented a nitrogen *in vitro* technique, and has been propagating citrus, papaya, anthurium, plantain, orchids, and loroco. At Universidad Católica de Occidente (UNICO), a professor is using somatic embryogenesis assays on *Spondias* (jocote), an important commercial tropical fruit, and conducting experiments with forest trees such as mahogany and pine. After the professor was trained by the volunteer, she trained 30 students. At El Salvador University (UES), one teacher received a CATIE/Borlaug scholarship, and used this funding to train with the volunteer at the University of Florida in 2006. She is also passing this knowledge on to her students. At National Agriculture School (ENA), a teacher has applied most of the recommendations given by the volunteer such as material and equipment handling. She has carried out experiments on somatic embryogenesis using pine tree explants. The teacher transferred the knowledge provided by the volunteer to 28 students during 2006, 39 students during 2007, and 76 students in 2008. The CENTA lab has also been working on jocote, implementing a methodology for plant embryos to induce somatic embryogenesis. FTF trainees report that they stay in contact with the volunteer and are receiving additional assistance with their work.

Ten members of a women's association gained new knowledge for processing and selling pickles, jams, and jelly. Average monthly sales increased from zero to US\$400 in 2007. They have implemented all the recommendations provided by volunteers on GMP and new product formulation.

IICA/FRUTALES has followed volunteer recommendations to implement a pilot audit system for their food processing clients. FRUTALES is working with 12 food processing companies to improve processing control, facilities, and quality. They also provide assistance on export procedures.

FRUTALES also implemented volunteer recommendation for a fruit market information system (see www.frutal-es.com). Following a user survey designed and conducted with the volunteer, information was added to meet user needs such as prices, market channels, daily market news,

² Any portion of a plant taken to initiate tissue culture

demand forecast, export and niche opportunities, information for how to export and how to form a farmers association, and market information from neighboring countries. FRUTALES is also sending information using cell phone messages.

Before the assistance of volunteers, a rural women's cooperative, with seven active members, had difficult financial and production problems. After FTF assistance, they developed new products and gained new skills in how to market, calculate production costs, GMP, and HACCP. Now the cooperative has a license, brand name, attractive label, and bar codes, selling products at five Wal-Mart Supermarkets in El Salvador. They supply the stores with 720 jars per month; the price for each jar is US\$2. This cooperative also received a grant of US\$45,000 to improve their kitchen facilities, as recommended by the volunteer.

Another women's cooperative started one year ago to produce tropical fruit candies following volunteer recommendations. Now they produce four products: nance and coconut candies, cashew apple raisin, and tropical fruit flavoring. They record production costs and process guidelines to obtain uniform products. With the increased profits, they will soon expand into an industrial kitchen. They received training on packaging, branding name and correct label information. As a result, monthly sales have tripled, from US\$150 to US\$450.

Dairy

Strategy

The Salvadoran dairy market totals US\$262 million; 79% is produced locally. Dairy production has grown since 1996 as result of improved milk production, stronger associations, and improved relations between producers and processors. In spite of this progress, the dairy sector has many challenges to become more efficient and competitive in local, regional, and export markets. Dairy exports during 2006 totaled US\$6.5 million. Dairy imports during the same year totaled US\$ 71 million. Cheese imports are growing 7.5% annually.³

Dairy in El Salvador represents 18% of agricultural GDP. There are 65,000 cattle farms in the country.⁴ In 2006 dairy generated more than 160,000 permanent jobs and 802,000 temporary jobs,⁵ representing 26% of El Salvador's agricultural employment. The average cattle producer has rustic production technologies and feeds the cattle with pasture; few farmers use commercial feed. Milk production is concentrated in the rainy season. Farmers have higher milk yields and lower prices during this season, and low yields with high prices during the dry season.

El Salvador has six large-scale, industrial dairy plants, processing between 10,000 - 60,000 liters/day. This formal sector processes 25% of milk produced in the country. There are at least 635 artisan plants of different sizes and technology levels, with an average of 225 liters per plant⁴. Most artisanal plants do not meet food safety standards. They process 75% of the milk produced in country, mainly for cheeses and cream. Generally, they sell their products in municipal markets and supply cheeses to "pupuserías" and restaurants. Annual cheese sales are roughly US\$150 million (38% imported). Cost of production from 2004 to 2006 was stable, but in 2007-8 the prices increased 20% to 30%, due to the high price of raw materials (mainly corn for feed), and fuel.

³ Análisis de la competitividad del sector lácteo artesanal, TechnoServe El Salvador, 2005.

⁴ Anuario estadísticas agropecuarias 2007, MAG.

⁵ Informe de Coyuntura, Oficina de Políticas y Estrategias MAG, 2007.

Activities

FTF worked primarily with artisanal dairy processors, but many of the volunteers' activities also impacted milk production and handling. After analyzing the weaknesses of dairy value chains, Winrock and partners decided to strength different activities:

At the farm level:

- Reduce high costs of milk production focusing on improved pastures/feed during the dry season (e.g., silage, concentrate formulation, hydroponic grains)
- Stabilize milk price fluctuations through the year by improving yields and quality
- Practice milk hygiene
- Verify milk quality (somatic cells count, cooling tanks)
- Improve animal health, nutrition, and reproduction

At the processing plant level:

- Promote a national quality seal for dairy products
- Improve price to farmers based on milk quality
- Introduce new cultures, pasteurization, improved equipment, and new ingredients
- Develop new milk products
- Adopt GMP and quality standards

At the business organization level:

- Improve administrative and financial management for dairy processors

FTF fielded 18 volunteers to train farmers and processors on improved cheese processing techniques and new cheese formulas, improve animal sanitation, hygienic milk, on-farm milk quality, dairy plant operations and processes, dairy plant financial controls and management, and new sustainable technologies for animal feed. Volunteers visited local dairy farms and worked with the farmers to make improvements. They helped develop a wastewater treatment system and built a forage production system. They introduced hydroponic forage so farmers could keep milk production steady throughout the year. They also taught farmers techniques such as teat dipping to lower mastitis incidence. Farmers and dairy processors implemented better methods for cooling and collecting milk in order to prevent milk from spoiling.

Results

As a result of FTF assistance, 12 cheese processors and associations representing more than 700 producers are strengthening their management and operations following international standards, improving product quality, and increasing production and gross sales. Volunteers introduced the use of commercial and lactic cultures as well as pasteurization, and established a standard of quality that is now used by producers throughout the country.

Five cheese producers have redesigned and rebuilt their processing plants following volunteer sanitation recommendations. Together, volunteers and producers developed new formulations to produce a greater variety of cheeses such as Colby, Mozzarella, and Cheddar. Farmers have improved their competitive position and are earning more money. Four semi-industrial plants have increased their net income by US\$30,000 per month.

One volunteer introduced hydroponic feed as alternative to replace high-cost commercial feed and improve water management. In the pilot project established with his assistance, the cost of

hydroponic feed by pound is between US\$0.09 - \$0.13 compared to US\$0.30 for commercial feed. The pilot project showed a calf weight increase of about 1 pound/day, compared to an increase of 0.6 pounds/day using previous feed regimens. Milk production increased 10%, from 14 bottles/day to 15.4 bottles/day. USDA-TechnoServe has built three more hydroponic forage modules and obtained funding to construct 20 more.

As another example, four farmers have constructed concrete deposits filled with fresh water to cool down milk immediately after milking to avoid acidity and bacteria multiplication. As part of training given on prevention of mastitis, producers have reduced illness by 50%. Also, they have begun to buy the California kit for early mastitis detection.

After a volunteer demonstrated that a methane bio-digester project is feasible, FTF's local partner TechnoServe executed an agreement with Agricultural Business Machinery, which imports bio-digester equipment from Brazil, to supply all the equipment required to build three bio-digesters during 2008.

A study by one volunteer verified that El Salvador has adequate equipment meeting FDA norms, in at least one local reference lab, to analyze milk products. In a second trip, he introduced eight artisan plants to commercial lactic cultures and pasteurization. Later this technology was adopted by three more dairy plants. Using commercial cultures increased yields by 5% and improved flavor, texture, smell, color, and shelf life (which increased from 15 days to two months). With all of these improvements sales at one of the plants, it increased from US\$106,000 in 2005 to US\$200,000 in 2007.

Following a feasibility study for a dry whey plant, three dairy plants are developing flavored beverages from liquid whey. The plants are awaiting authorization for commercial sale, designing brands and labels, and carrying out focus groups for marketing. Sales projections for this new product in 2008 are US\$200,000 with net income of US\$70,000.

A volunteer helped the dairy industry by working with key dairies in the country. After his first visit, a manual was delivered to the National Council of Science and Technology (CONACYT). CONACYT is using this information to develop the Quality Dairy Seal for El Salvador. After his second visit, the host improved its Mozzarella, Izalqueño, Monterrey Jack, and Colby cheeses. Now those cheeses have better texture and flavor using new lactic cultures and other improvements. This plant has increased its sales by US\$238,000 per year. In one plant, he developed Colby cheese with different colors and new presentation. This new product represents an increase of US\$30,000 in sales. In another plant, he developed Parmesan, Mozzarella, Feta, and Cheddar cheeses, which increased plant sales by US\$33,000. In other plants, this volunteer improved cheese formulation and processing, increasing sales by US\$62,000 and improved formulation and processing, increasing sales by US\$30,000.



Implementing new processing practices

Another volunteer helped one host develop a five-year work plan aimed at 20% annual growth. This host will invest US\$1.5 million to upgrade all of its facilities. This year, the host implemented washing line improvements, and also has implemented a test to determine individual producer milk quality. Prior to FTF assistance, this host reported a baseline of US\$623,000 in 2004. For 2008, it is reporting total gross sales of US\$7.3 million, with assistance from FTF and TechnoServe's USDA-funded Dairy Development Project.

One volunteer improved the organizational structure of one host that now has developed a chart and manual of functions, which has helped increased staff efficiency. A committee now meets every 15 days to analyze business finances. As a result, gross sales increased 3% last year (US\$33,000). This plant decreased costs by improving personnel management and reducing administrative costs. Now that the Manager and Board are more involved in daily operations, they have also reduced losses due to theft.

These recommendations have touched the lives of thousands. Waste disposal improvements reduced pollution. Before, liquid whey was dumped directly into rivers, but now it is used to make a variety of products that can be used in bakeries, drinks, ice cream, yogurt, and cattle feed. This eliminates 4,900 liters of liquid whey from being poured into rivers every day. Approximately 20,000 people living in surrounding communities benefit from cleaner rivers.

El Salvador FTF Impact at a Glance

Number of:	Dairy	Horticulture
Producers organizations strengthened administration, management, and financial controls	9	13
Producers organizations increased revenue	3	11
New contracts, orders, and joint ventures	3	29
New formal agreements/business relationships to share market and technical information	29	28
Producers and processors increased capacity to operate in liberalized trade environment and implemented sustainable farming practices	700	2,110
Cumulative increase in gross sales	\$7.4 million	\$9.2 million

Guatemala

Horticulture

Strategy

Guatemala has 400,000 hectares with the potential to produce high-value horticultural products, such as vegetables and ornamentals, and generate up to 1.3 million jobs. In the last 10 years, horticultural productivity has increased by 50%. Total exports of horticultural products increased from US\$1 billion in 1990 to US\$2.9 billion in 2007.⁶ Ornamentals generate 60,000 jobs in 200 companies, 80% for women. FTF focused on Guatemala's Western Highlands, where 80% of producers are small-scale (with an average of 0.5 ha per family). Producers have little access to

⁶ Banco de Guatemala 08 Declaraciones de mercancías y formularios aduaneros únicos centroamericanos de exportación

credit, no government support for technical assistance, and few nonprofit organizations with the expertise to successfully link small-scale producers to profitable markets.

With the help of key partners such as AGEXPORT, LA FTF identified two major weaknesses in Guatemala's horticultural subsector--the lack of specialized technical assistance to competitively produce the quality and quantity required by the markets and the lack of market knowledge and business skills to accurately define market requirements so that investors can make sound economic choices to reach the commercial scale necessary to be competitive.

Though the value chains for vegetables for international markets are generally separate and distinct from the national market, the problems are similar in both. Value chain participants lack knowledge of marketing and prices, they do not have strong administration and commercializing departments, they lack research programs to improve production, and they need to improve postharvest management.

Activities

Based upon these weaknesses, LA FTF worked with local partners to strengthen human resources, particularly in technical issues such as integrated pest management (IPM), plant rooting, cold chain management, seed certification, new crop management, and low-cost food processing, such as solar dehydration. FTF volunteers taught partners and hosts how to research new potential markets, and helped develop managerial skills such as business planning, strategic planning, branding, and financial analysis, to improve business decision making and strengthen producer organizations.

FTF volunteers introduced new technological practices for fresh vegetables, ornamental plants, and sweet pea seed production. A volunteer also improved the vanilla product of one plant with dry processing. FTF trained 25 technicians from private food laboratories in food safety. The technicians from 15 companies now understand how to find FDA regulations through the internet. In the export sector, FTF strengthened AGEXPORT's DITEX program (a technical course with a diploma in exporting). The volunteer worked directly with 50 students and improved the curriculum.

Volunteers also helped hosts prepare business plans and market analyses, such as:

- market studies for vanilla, Asian vegetables, dehydrated and pineapple jelly, onion, carrots, cabbage, cucumber, and tropical fruit concentrate
- a marketing plan for AGEXPORT's nontraditional agricultural products committee
- strategic and business plans for an indigenous farmers' organizational market study for different products with indigenous farmers in the Polochic river basin

Results

LA FTF completed 40 horticultural assignments, strengthening 16 organizations serving more than 18,000 farmers and their families (approximately 70,000 indirect beneficiaries). For example, LA FTF helped hosts to adopt improved models for commercialization and value chain management (e.g., by eliminating middlemen and establishing consolidation centers). Hosts learned to use business management tools such as a strategic business plans and learned how to negotiate with different kinds of buyers. This association and its commercial marketing arm increased sales 10-fold--from US\$5,000 a week in 2004 to US\$56,000 a week in 2007. These results were achieved with technical assistance from FTF volunteers and financial resources from other programs. The number of women working in the vegetable processing plant increased from

10 to 30. Wages are used in part to pay for medicine and school fees. The number of children attending school has increased; some of the children are now in high school with transport and scholarship support from this host.

LA FTF helped to improve the competitiveness and profitability of the sweet pea subsector by tackling problems with poor quality imported seed. Following volunteer recommendations, the producers adopted a seed quality control system involving laboratory analysis to check germination, variety, and other variables. This significant improvement increased production by 7% (from 12,857 pounds/hectare to 13,714 pounds/hectare) and decreased postharvest losses by 3% from 2006 to 2007. With a total of 3,500 hectares producing peas for export, this resulted in more than US\$1 million in new sales in 2007. Following the volunteer's recommendations, a pea committee conducted trials to improve two pea varieties. Now two years later, they are providing purified parent seeds to a private company to produce commercial seeds and through this company they have a contract with farmers in the US to produce them. In 2009, Guatemala's pea producers will have a certified seed, which will further improve crop yields and decrease seed costs. These improvements impact approximately 30,000 pea farmers and 17 exporting companies.



Women from the Paraxaj community in Guatemala packing lettuce for a new buyer

Ornamentals is another large subsector in Guatemala, with annual sales of more than US\$70 million and employing 60,000 rural people (80% female). FTF volunteers helped develop new products (e.g., bouquets). One participating company reported sales of the new bouquets valued at more than US\$1.1 million per year (approximately 75,000 bouquets per year with a price between US\$10 to US\$20 each and an average marginal income of US\$7 per bouquet). Another company reduced costs by saving 5,000 rooted cuttings of croton per week after changing the fertilizer composition based on FTF recommendations. Some companies learned new techniques in rooting ornamental plants, established better integrated pest management practices, and improved monitoring systems to ensure insect-free exports.



A volunteer demonstrates new types of flower bouquets to add value and increase income

A total of 100 enterprises were trained in cold chain management representing 80% of the ornamental subsector. For example, one host adjusted their ornamental storage temperature ranges, which has increased flower life by approximately 4 days.

FTF volunteers from USDA/APHIS and the University of Florida helped establish a monitoring system for early detection of *Thrips palmi*. Guatemala's Ministry of Agriculture established a new cooperative agreement with the USDA quarantine station in Miami for the verification of any *Thrips palmi* diagnosis. This monitoring system is

essential to maintain Guatemala's ornamental exports and take advantage of CAFTA. The government is operating the monitoring system around the country, benefiting about 125 export enterprises (100% of the ornamental export subsector).

LA FTF volunteers trained more than 1,200 current and future horticultural professionals in private companies and universities through direct workshops in the field and seminars at the universities; training included new technologies such as the polymerase chain reaction (PCR) methodology for disease detection in plants and food.

New technologies such as solar dehydration for horticultural products and spices helped hosts develop new products and add value, and benefit producer organizations - 12 direct beneficiaries working with vanilla and 21 direct beneficiaries working with the bitter melon, *Momordica charantia*).

LA FTF contributed to Guatemala's 20% export growth in targeted value chains such as peas and ornamentals. FTF hosts are more competitive and profitable due to improved pest and crop management, better quality seeds, and more effective harvest and postharvest practices. Participating farmers and enterprises also have a better understanding of international market requirements and business management.

Tree Crops/Forest Products

Strategy

Guatemala's tree crops and forest products subsector includes wood products, nontimber products such as handicrafts, fruits, vegetal fibers, coffee, and in the last two years biodiesel processed from *Jatropha curcas*. Guatemala has 30,754 km² of forest cover (28% of the country) mainly in the departments of Petén, Quiché, Izabal, Huehuetenango, and Alta Verapaz, the export income for timber products in 2007 was US\$87 million, US\$17 million more than 2006.

Small-scale landowners are usually not interested in working in forestry, because they prefer to cultivate other products with a shorter crop cycle. Those that have some interest tend to organize in cooperatives or associations. Large landowners are of two types: those that integrate forward into processing and those that prefer to sell the trees as logs and are often taken advantage of by intermediaries. For both smaller and larger enterprises, wood harvest technologies are very basic. These landowners generally sell to local markets, lack quality control, and their major problem is low prices.

Primary wood processors have 47,800 employees in this portion of the value chain. Employee turnover is high and skill levels are low. Guatemala's secondary wood processors include small-scale companies that manufacture furniture for the national market and larger companies that have identified a niche export market; both types of companies need more knowledge regarding markets and business administration.

After the coffee crisis, Guatemala also began to diversify in fruit tree production, introducing varieties suitable to local climates. Although these new products, such as rambutan, lychee, and papaya, have market potential, the lack of technical expertise on production and general plant requirements has been a constraint.

With the help of key partners such as the Forest Cluster and PROFRUTA (the fruit promotion program funded by Guatemalan government), LA FTF targeted key weaknesses, such as lack of specialized technical knowledge to competitively produce the quality and quantity required by markets, lack of enterprise management skills, weaknesses in producer organizations, and lack of technical knowledge about new crops.

Activities

LA FTF fielded 26 volunteers to address issues such as the advantage of smaller wood diameters, vegetal fiber processing, management of cacao, rambutan, lychee, zapote, and chico zapote, IPM for *Cosmopolites sordidus* in plantain, biodiesel industrial processing, and bentwood chair making. Volunteers also strengthened managerial skills in business planning, developing new lines of products, marketing research, and branding.

FTF assisted coffee farmers associations in Guatemala after a drought and hunger crisis in the municipality of Jocotán. They have approximately 400 indigenous Chorti people, 250 of whom are permanent workers, and the majority of its members are women.

Artesanías Mayan Ken and many other small producing groups of Sololá (areas affected by Hurricane Stan) such as El Quiche, Chiquimula, Sacatepéquez and Chimaltenango partnered with FTF through the handicraft commission at AGEXPORT to provide technical assistance and training to these women's groups. Volunteers helped create new handicraft products for local and export markets. In all focus areas, FTF completed 30 volunteer assignments in collaboration with AGEXPORT, which has a strong track record in employing women (50% of its managers are women). By targeting subsectors such as ornamentals and handicrafts, which employ a large number of women, FTF ensured that women benefited from USAID's investments.

Results

LA FTF impacted more than 8,000 farmers and their families and technicians in various tree crops and forest products. Following are examples of the results.

Three years after a plantain assignment with seven technicians and 40 growers in the Polochic River Basin, FTF partner CARE's beneficiaries reported an increase in sales to around US\$58,800 per year with an increased net income of US\$21,600 per year on 12 manzanas (mz) (84,000 m²). Prior to the volunteer's visit, the plantain farmers typically had gross sales of roughly US\$1,000/mz/year. Now, under improved management, they have gross sales of approximately US\$5,000/mz/year. These increases were due to improved planting, pest control, and pruning practices.

The 20 members of AGEXPORT's Avocado Committee reported that regional sales increased by US\$31,000/year, two years after an assignment on harvest and postharvest handling. In Chiquimula, one host reported the creation of Comercializadora Chortí following the business plan developed with FTF assistance. This host has changed their marketing and sales methods, and now offers new products to the market and the farmers. They have also created a registered trademark.

One host association is comprised of two organizations representing 2,750 indigenous farmers from three ethnic groups in the Atitlan Lake River Basin. Two FTF volunteers helped improve product presentation and trained association technicians in marketing research. The association

reports that improvements such as a new brand helped close a new contract in 2008 for 25,000 pound of coffee generating \$60,000 in new sales for the 2750 producers.

Over the past five years, FTF trained more than 1,000 technicians in various horticultural topics. Furthermore, contacts with experts and germ plasm banks were established between PROFRUTA and Puerto Rico and Hawaii, providing access to new varieties and technology.

Guatemala FTF Impact at a Glance

Number of:	Horticulture	Tree Crops
Producers organizations strengthened administration, management, and financial controls	12	13
Producers organizations increased revenue	6	6
New contracts, orders, and joint ventures	11	9
New formal agreements/business relationships to share market and technical information	4	3
Producers and processors increased capacity to operate in liberalized trade environment and implemented sustainable farming practices	2,871	1,842
Cumulative increase in gross sales (US\$)	4.3 million	530,765

Honduras

Horticulture

Strategy

LA FTF supported Honduras' Rural Development Strategy, which aims to diversify agricultural production, increase productivity, and create links between agriculture and higher value processing and marketing. Fresh fruits and vegetables are widely produced in Honduras. Importantly, large land holdings are not required for vegetable production; three-fourths of Honduran producers operate farms of less than 5 hectares.

Honduras has the potential to produce a wide range of fresh fruits and vegetables and has an expanding market for high-value horticultural products. Vegetable imports are on the rise, valued at US\$271 million annually. Vegetables and fruits are produced primarily in the valleys of Comayagua, Olancho, Choluteca, and La Esperanza. Farmers cultivate 24,000 hectares of vegetables. There are roughly 15,000 small vegetable production units.

Most horticultural producers have limited options for selling their products due to low volume, inconsistent product quantity and quality, poor transportation, marketing and export infrastructure. For producers to take advantage of CAFTA, they must understand and satisfy sanitary and phytosanitary (SPS) requirements, produce market-demanded varieties of consistently high quality, and schedule their production to meet limited windows of market opportunity.

Activities

FTF assignments addressed constraints in pre-production, production, harvesting, postharvest management, value added activities, and marketing. FTF fielded 23 volunteers to help small-scale farmers access higher value markets. FTF collaborated with the USAID/Manejo Integrado de Recursos Ambientales Proyecto (MIRA) Project and NGOs such as Agros International,

Visión Mundial, and TechnoServe. FTF worked with food processors to expand and create new, higher value markets for farmers' products. FTF also worked with two agricultural universities to strengthen horticultural and irrigation training programs.

For example, FTF conducted four assignments improving irrigation. Volunteers conducted a training of trainers' course in collaboration with USAID-funded MIRA on drip irrigation installation, maintenance, and operation to help farmers improve vegetable production. Other volunteer assignments addressed value chain analysis, seed production, pest management, greenhouse production, postharvest handling and marketing.

Results

FTF has strengthened the capabilities of ten organizations supporting horticulture. Volunteers worked with 1,600 direct beneficiaries. Visión Mundial, the Intibuca Association Vegetable Producers (APROHFI), and TechnoServe report that 800 vegetable producers in La Esperanza have benefited from FTF assistance. Farmers have increased yields (by as much as 30%), improved product quality due to more efficient irrigation systems, improved crop management, and adopted IPM practices. As a result of better quality produce, prices increased from 2005 to 2008 as follows:

Strawberry:	Beginning: US\$0.63/pound	End: US\$2.64/pound
Cauliflower:	Beginning: US\$0.079/unit	End: US\$0.19/unit
Broccoli:	Beginning: US\$0.12/unit	End: US\$0.19/unit
Lettuce:	Beginning: US\$0.14/unit	End: US\$0.19/unit
Squash:	Beginning: US\$0.10/unit	End: US\$0.17/unit
Celery:	Beginning: US\$0.10/unit	End: US\$0.15/unit

In La Esperanza, the vegetable association also improved farmer incomes by arranging sales in the sowing season, guaranteeing farmers a fixed price.

Six hundred producers increased their annual gross sales by US\$623,000 (from US\$629,000 to US\$1,252,000). Their annual net income increased by approximately US\$155,000. Two hundred potato producers increased gross sales from US\$2.3 million to US\$3.7 million and net income by approximately US\$346,000. This is a result of assistance from FTF volunteers and our local partners. Volunteers helped producers and processors to access new, higher value markets. For example, one FTF host is selling sweet chilies to the local market, such as supermarkets of Tegucigalpa. One supermarket is selling its chili paste to regional markets in Costa Rica, El Salvador, and Nicaragua. New contracts were signed with Pizza Hut; also they have continued to supply the main supermarkets in Tegucigalpa and San Pedro Sula.

Dairy

Strategy

In Honduras, the average yield per cow is 3.13 kg/day and in Latin America it is 3.27 kg/day, compared to a worldwide average of 5.6 kg/day. Honduras' dairy sector consists of approximately 50,000 producers, 600 artisan cheese enterprises, and seven industrial plants (two of those plants process 95% of the country's milk). Dairy producers expect many changes to result from CAFTA and they are concerned about their lack of infrastructure, technology, knowledge, and capabilities compared to other countries.

FTF volunteers addressed key constraints for Honduras' dairy sector such as:

- very little quality management,
- lack of pasteurization and unsanitary conditions,
- lack of cold storage facilities, and short shelf life;
- low milk yields with wide seasonal fluctuations;
- nutritional deficiencies leading to livestock health problems;
- poor packaging, labeling, and inadequate processing equipment; and
- lack of market orientation, high costs of marketing, and competition from foreign entrants into local markets.

Activities

FTF collaborated closely with the National Federation of Farmers and Ranchers (FENAGH) and USAID-supported milk collection centers across the country, called Centros de Recolección y Enfriamiento de Leche (CRELs), to improve cattle health and nutrition, rotational grazing, and milk handling and sanitation.

FTF completed 31 assignments in the dairy sector working with 33 CRELs, providing training in milk quality improvement, counting somatic cells, mastitis testing, sanitary processing, on-farm milk management, and product transport. Other topics covered by FTF technical assistance include animal health, milk processing, genetic improvement (e.g., artificial insemination), branding, packaging, and marketing. FTF and its partners placed heavy emphasis on helping farmers improve milk quality to achieve “quality level A” and consistently obtain a higher milk price.

Working with two agricultural universities, Centro Universitario Regional del Litoral Atlántico (CURLA) and Universidad Nacional de Agricultura (UNA), volunteers trained teachers and students in improved production and processing techniques, such as market analysis, labelling, packing, processing plant and equipment design, and extension programs to support product diversification and value-added processing. Volunteers helped producers and processors improve natural resources management, for example, training producers in soil and water resource conservation.

Volunteers also helped improve environmental protection and working conditions for workers in the dairy farms and processing plants by helping hosts adopt better equipment and improving waste water treatment and sanitation.

Results

Volunteers strengthened the capabilities of 35 organizations supporting the dairy sector, working with 2,100 direct beneficiaries. FTF strengthened Honduras' dairy sector as a whole by improving animal health, genetics, and cattle management, rotational grazing practices, sanitary milk handling and milk processing, financial management, and packaging, branding, and marketing.

Dairy producers have adopted technologies which upgraded their milk quality to “type A,” which currently pays \$0.46/liter, compared to \$0.35/liter prior to FTF assistance. From 2004 to 2007, 550 CREL members increased their annual gross sales by US\$2.1 million (from US\$8.3 million to US\$10.4 million) and annual net income by approximately US\$487,000.

Tree Crops

Strategy

The mango subsector in Honduras generates 20,000 jobs, an estimated US\$1.8 million in annual income, and has the potential to provide even greater income and employment. Mango is currently being commercialized by three enterprises in Honduras: one buys 20% of production for export to the US and Europe; another buys good quality fruit for national and regional markets; and a third enterprise in San Pedro Sula buys the poorer quality and cheaper mango to export in pieces. US and European markets for rambutan and mango are growing as are the El Salvador market for cashew apple.

Activities

Volunteers completed 22 assignments in topics such as technological practices for mango, rambutan, and coffee management. FTF improved the value chain for mango by increasing yields per hectare with better irrigation, pest control, and fertilization practices. Volunteers taught farmers how to produce mangos earlier with flower induction techniques; the farmers harvested two months earlier than usual and received better prices for their product. Market studies were completed for organic coffee, cassava, rambutan, and cashew apple.

Volunteers strengthened operations and management of other hosts to cultivate mango and guava. FTF worked with 130 rambutan producers to improve yields and quality, decrease postharvest waste, and expand the production area. For coffee and wood products, FTF increased access to high-value markets, especially with organic coffee. A state organization responsible for phytosanitation received FTF assistance for fruit fly control.

FTF worked with three coffee cooperatives in which the women's groups within the cooperatives were mainly responsible for the roasting, packaging, and selling coffee locally. FTF also partnered with IHCAFE, which has a specific gender program. FTF assisted coffee growers with improving product quality, postharvest handling, processing, packaging, branding, and marketing.

Results

FTF strengthened the capabilities of 14 organizations supporting the tree crop sector, working with more than 1,700 direct beneficiaries and an estimated 10,000 indirect beneficiaries. Producers have received \$58,000 in new sales after FTF assistance. These mango producers are now using flower induction technology to produce mangos during an earlier market window, and export their product to Holland to obtain higher prices. The rambutan producers have signed a contract with Dole to export their product to the US, targeting New York and California. One cooperative is exporting coffee to Germany and organic coffee to the United States. Three coffee cooperatives with more than 150 members increased their annual gross sales by US\$298,000 and net income by approximately US\$59,000.



Mango producers established new commercial relationships with regional supermarkets and processors

Honduras FTF Impact at a Glance

Number of:	Dairy	Horticulture	Tree Crops
Producers organizations strengthened administration, management, and financial controls	7	8	7
Producers organizations increased revenue	32	6	7
New contracts, orders, and joint ventures	32	30	18
New formal agreements/business relationships to share market and technical information	6	5	9
Producers and processors increased capacity to operate in liberalized trade environment and implemented sustainable farming practices	2,115	2,500	1,500
Cumulative increase in gross sales	\$38.8 million	\$5.7 million	\$6.1 million

Nicaragua

Horticulture

Strategy

Agricultural production in Nicaragua is dominated by basic grains. Fruit and vegetable production is relative low representing 10% of total production. Potatoes, onions, carrots, tomatoes and cabbage, as well as cauliflower, beets, and celery represent 74% of the total vegetable imports in 2005. Horticultural production is managed by 15,000 small farmers mainly in northern Nicaragua.

Although Nicaragua has excellent climatic and soil conditions, with abundant water to produce vegetables, farmers face important limitations such as lack of appropriate crop planning, diversification, and postharvest management and lack of market quality standards. There are few cold chain facilities. Farmers are geographical dispersed and face challenges aggregating their products.

Activities

Volunteers worked with different associations, cooperatives, NGOs, public and private universities, and individual farmers. Volunteer assignments focused on introducing new production and postharvest practices, such as drip irrigation systems, greenhouses, soil management, organic production, integrated pest management, crop diversification, and postharvest practices. Volunteers worked with hosts to share the information and encouraged them to produce crops for which there is a market. Volunteers helped hosts develop business plans and apply business skills to operate their farms more efficiently and help farmers make more informed decisions.



FTF hosts improved greenhouse design and operations

FTF worked with malanga, black pepper, Cinnamon and rambutan, coco, malanga lila and and malanga eddoes.

Results

Achievements in the horticultural subsector include:

- Farmers recognized the importance of linking vegetable production planning with marketing. Now, farmers produce different types of vegetables year round, such as beets, lettuce, carrots, broccoli, cilantro, and Chinese cabbage.
- Farmers practice integrated pest management, which reduces their costs in tomato production, while increasing their yield per manzana, increasing farmers' incomes.
- Farmers are now testing their soil to assess nutrient and fertilizer content so they enhance the soil with only deficient minerals, which increases production and reduces input costs.
- Producers improved greenhouse construction, which provides better air circulation in the tunnels and produces stronger seedlings.
- Another host improved marketing with the registration of a trademark in Nicaragua
- Hosts improved business skills of with better decision tools based on timely inventory, cash, and budget statements.
- Farmers and processors established new market linkages.

For example, with volunteer assistance, one host established business relationships with Caribbean Fruit Connection in Miami, exporting 17 containers of malanga (approximate value of US\$20,000 per container). With the addition of four more cooperatives and one association, this export alliance has expanded to 47 members. Due to the success with malanga, the association will expand farming in three more municipalities and build a new packing plant to add value to their fresh produce. They are in the process of acquiring new equipment to meet GMP and HACCP standards.

Over the life of project, nine organizations strengthened their administration, management, and financial controls; five organizations increase revenue; hosts established 16 new contract, orders, and joint ventures and five new formal agreements; and 2,000 producers increased their capacity to operate in a liberalized trade environment.

Dairy

Strategy

Nicaragua has many advantages in the production of dairy products, including the largest country in Central America in term of land area, a range of altitudes, favourable climatic conditions, and the largest cattle population in Central America. Dairy and livestock account for 10% of Gross Internal Product. Dairy products, mainly cheese, are part of Nicaragua's 20 principal export products. During 2007, dairy exports were valued in US\$96.3 millions compared to US\$62.7 millions in 2006.

However, the sector faces challenges. Some of the most important weaknesses of the dairy sector include:

- very low milk yield and different sanitary levels;
- low capacity of dairy farmers to diversify and transform primary dairy products;
- lack of Good Manufacturing Practices; and
- limited knowledge of market opportunities.

FTF introduced improved clean milking technologies and practices, genetics and dairy management and sanitation, which will result in higher quality of milk, allowing producers to be more competitive.

Activities

FTF provided assistance to help producer associations and NGOs link their members to higher value markets through improved quality and new products, as well as strengthening their internal operations and service delivery. FTF volunteers improved milk quality, animal health, and management of small- and medium-scale farms. Volunteers provided advice on hygienic milking habits and to improve storage facilities and feeding practices.

Volunteers provided assistance on intensive rotational grazing --intensive grazing and electric fence design and construction --disease management, silage production and preservation, and improving overall herd health such as addressing mastitis. FTF program worked to expand managerial and business capacity of individual farms and producer organizations.

Results

Due to volunteer interventions, farmers associated with CONAGAN have reduced calf mortality by 80% when technicians applied and assisted farmers in calves' birth with steps such as pre-anaesthesia and disinfection. For those involved in intensive rotational grazing, cattle have increased their weight by at least 50%. Another partner NGO developed a new strategy for assisting small-scale dairy farmers by classifying the different farm types and tailoring farm services to each size and type of farm.

Four hosts have reported increased gross sales of US\$260,000 for dairy producers after adopting improved technologies and practices introduced by FTF volunteers. Another result is the increase of milk price by one host in the last year, from US\$0.21/liter up to US\$0.25/liter due to a better product quality.

Eight organizations strengthened their administration, management and financial controls; four organizations increase revenue; and 10 hosts established new contracts, orders and joint ventures. Hosts established five new formal agreements to exchange technical and market information; 1,800 producers increased their capacity to operate in a liberalized trade environment.

Nicaragua FTF Impact at a Glance

Number of:	Dairy	Horticulture
Producers organizations strengthened administration, management, and financial controls	8	9
Producers organizations increased revenue	4	5
New contracts, orders, and joint ventures	10	16
New formal agreements/business relationships to share market and technical information	5	6
Producers and processors increased capacity to operate in liberalized trade environment and implemented sustainable farming practices	1,800	2,000
Cumulative increase in gross sales	\$3 million	\$800,000

Analysis of Key Impacts, Successes and Failures

Methodology for measuring impacts

Winrock's monitoring system was established to provide the information that FTF staff needs to manage for results, as well as to provide data for reporting. We gathered the data that is most useful to hosts, partners, and field staff, and cost-effective to collect.

Baseline data was collected at the host and subsector levels. Baseline data for individual hosts was collected in the scope of work. This profile included available information about the host's production, services, membership, and incomes, and enabled hosts and field staff to assess changes after the volunteer assignment. This data also informed the volunteers about the host's capabilities. By working in subsectors that have already been targeted by USAID and local governments, Winrock used existing subsector data, rather than spending resources to conduct new sector and competitiveness analyses. Existing data sources included studies from USAID and other donors, government statistics, and analyses conducted by FTF partners. In a few cases, volunteers collected some data as a secondary activity during their assignments.

Output data was collected in the volunteer's debriefing and end of assignment report. Field staff and partners conducted follow-up impact surveys for 318 of 331 assignments (96% of the scopes of work; 13 surveys were not completed because the assignments were too recent to show impacts). These surveys were an important tool for field staff and partners to provide additional guidance to the hosts.

Some impact data was gathered through direct observation (for example a new product or enterprise can be observed). However, most impact information was gathered by interviewing the host and other assignment participants. The survey format is an outline for in-depth interviews, which means that the interviewer does not follow a strict survey form, but instead asks open-ended questions that guide the conversation to discuss assignment results, lessons, and next steps. Survey questions were translated into terms that are appropriate for the local language and particular assignment situation.

Based on LA FTF's value chain approach, Winrock analyzed quantitative and qualitative impacts in different ways. LA FTF field staff and partners documented tangible results, such as increased gross sales and net income, for targeted value chain actors including producers and agro-enterprises. Staff also documented qualitative results such as changes in technologies and practices that can lead to improved value chain competitiveness. Lastly, LA FTF documented and analyzed sustainability indicators, such as new formal agreements or joint ventures that hosts executed with FTF assistance. For this final report, quantitative data is compiled in EGAT's FTF indicator tables. Qualitative information is provided in focus area summaries, success stories, and case studies.

Qualitative assessment of impacts

In addition to the quantitative impacts, LA FTF hosts, volunteers, and staff achieved many qualitative impacts. For example:

- FTF technical assistance empowered women. They learned new skills, gained confidence, and increased their earning power.
- FTF technical assistance promoted new alliances and collaboration among value chain stakeholders—farmers, agribusinesses, and agricultural support institutions.

- Farmers improved natural resource management and improved producer and consumer health, for example by improving water conservation and significantly decreasing the use of unsafe and inappropriate agro-chemicals.
- LA FTF fostered entrepreneurship and innovation among producers and agribusinesses.
- Overall, the skills, knowledge, and confidence of farmers increased through trainings and active participation.

Key accomplishments in addressing sector constraints

The following accomplishments were common throughout the focus areas in the Central America.

Quality improvements to access higher value markets. For example, horticultural value chains have two main market channels, one which includes the retailing within the national and Central American markets. At the retail level, national and Central American consumers buy horticultural products in wet markets; supermarkets; and hotels, restaurants, and institutions (e.g., schools, hospitals). In many instances, FTF beneficiary organizations were not effectively accessing national or regional markets. Many volunteer assignments addressed production and postharvest handling to improve quality, consistency, and food safety and strengthen relationships with wholesalers, distributors, and regional markets. Successful efforts led producers to build relationships with higher-value markets such as hotels, national restaurant chains such as Pizza Hut, and other institutions. In the second market channel, horticultural products are exported and sold in overseas retail outlets such as the US and Europe. LA FTF sourced US volunteers who were active at this level of the supply chain to improve quality and reliability, and establish new international market linkages for various horticulture and tree crops.

Improving economic opportunities for women. Throughout planning, implementation, and monitoring and evaluation, LA FTF staff and partners made particular efforts to consider gender issues and ensure that women benefited from project activities. For example, during annual work planning and scope of work development, staff and partners considered the roles that women play in the target subsector, and at what points of the value chain women are most active, as well as how proposed FTF assistance might affect them. LA FTF targeted particular value chains (such as ornamentals) and tasks (such as processing) where women predominate. FTF worked through NGOs that specifically target women in Guatemala to organize training for times when women are less busy and in settings where women feel comfortable. FTF also targeted value-added activities such as small-scale food processing and handicrafts, which lend themselves to self-employment. While these activities often pay less than the average agricultural wage labor, they allow women more flexibility in their work environment and schedules. FTF volunteers helped women's groups to access higher value markets and obtain better prices for their goods.

Major Lessons Learned

During the past five years, LA FTF gained many lessons about program implementation, value chain strategies, managing effective partnerships, and how to make the best use of volunteer technical assistance. Following are some of the key lessons.

Strengthen links between producer groups, agro-processors, and support institutions. FTF volunteers and staff strengthened value chain alliances among producer organizations, agro-processors, and support institutions. To sustainably integrate smallholders into competitive value chains, these three groups must work together effectively. An example of this strategy was the relationship between a Guatemala association and a private processing and marketing company. Mayan farmers own 50% of the private company, which buys fresh vegetables from them, adds value through washing, cutting, and packaging, and sells the produce to Wal-Mart and other buyers, returning an acceptable margin to both the agro-processor and producers. To enhance the competitiveness and growth of these two hosts, LA FTF volunteers addressed business planning, marketing, contract negotiation, and cold chain management. As a result of this assistance, provided in collaboration with the trade support institution AGEXPORT, host sales increased ten-fold – from US\$5,000/week in 2004 to US\$56,000/week in 2007. LA FTF volunteers supported similar value chain alliances working with hosts in Guatemala, El Salvador, Honduras, and Nicaragua.

LA FTF staff also observed that when volunteers provide agro-processors with technical assistance related to market requirements and quality improvement, the processors share this information with producers and manage quality improvements along the whole chain. This approach is more sustainable, cost-effective, and broad-based than if FTF worked only with producers.

LA FTF's focus on high-value crops and trade capacity building supports food security. A recent USAID/Latin America and the Caribbean study⁷ concluded: "Poor farmers in many LAC countries tend to be relegated to farming on small plots in some of the less fertile and more isolated areas of their countries. This is a major reason why many USAID Missions have refocused their agricultural programs on increasing farm incomes rather than food or agricultural production more generally. Many small farmers may find that their comparative advantage still lies in producing cash crops for higher-value, niche markets, while others will find that higher prices for basic grains offer an incentive to increasing production of these crops and/or adding value to them." The study concludes that food insecurity in LAC countries is caused by poverty and inequality (the inability to buy food), not the lack of availability of food. LA FTF's support for high-value horticulture, tree crop, and dairy products increased the purchasing power of FTF beneficiaries to pay for food, health care, education, and other necessities.

Demonstrable interventions are the most effective. Some of LA FTF's most effective interventions were those where the farmers and agribusinesses were able to observe the results firsthand and within a short timeframe. The demonstrated technologies encouraged farmers and value chain participants to implement the volunteers' recommendations, invest their time and scarce resources, as well as disseminate their experiences to their peers. Interventions that were

⁷ USAID LAC Trade Matters, Issue #59, September 15, 2008, Adapted from a study prepared by Roberta Van Haefen, Clarence Zuvekas, Violeta Roman, and Peter Bittner, under USAID LAC Equitable Growth Best Practices Task Order with Chemonics.

affordable and readily available to the farmers proved quickly adopted and replicated. Successful examples from LA FTF include low-cost greenhouses, drip irrigation, hydroponic forage production, integrated pest management, temperature adjustment for cold chain management, and use of different particle sizes for plant medium to minimize water use.

Working with associations and private sector support institutions maximizes impact.

Working with cooperatives, associations, and producer groups was a cost-effective means for LA FTF to reach the maximum number of beneficiaries with limited resources. Many assignments were designed to transfer volunteer's knowledge to association members and technical personnel who conduct producer and processor training. Local partner staff accompanied the volunteers during FTF technical assistance and training, so they gained new on-the-job knowledge and experience.

Partnerships with other NGOs maximize resources and results. FTF's collaboration with other NGOs, such as TechnoServe and Vision Mundial, was effective by combining resources to maximize results and impact on beneficiaries and avoid unnecessary duplication. LA FTF's host implementation partners have decades of experience on-the-ground, and are well respected. Local technicians helped orient the volunteers and provide follow-up training and assistance to the beneficiaries to ensure that hosts were able to adopt volunteer recommendations. Close communication among project managers and staff allowed each program to focus on and strengthen different aspects of the same value chain and provide assistance in their areas of expertise.

Cooperation with government ministries and agencies improved government services for farmers and food processors. By forming strong partnerships with agricultural ministries and agencies, LA FTF was able to gain support for its activities, create an important network between hosts and governing institutions, as well as effectively represent farmer's needs to policymakers. Field staff invited government representatives to participate in the training programs to garner the support necessary to effect widespread and sustainable technology transfer improved government services.

FTF public outreach is important to gain partners and hosts. The FTF Program conducted both US-based and host country public outreach campaigns, which proved to be highly effective in promoting the goals and objectives of the program. The US-based public outreach strategy allowed FTF to facilitate market linkages between US and Central American businesses, as well as attract interested volunteers for various technical assignments. The host-country public outreach approach allowed LA FTF to find effective hosts that were committed to growing their businesses and improving competitiveness, spread FTF technical information beyond the direct beneficiaries, and educate host country citizens regarding US foreign assistance.

Recommendations

The lessons extracted from the last five years of program implementation in Central America resulted in the following set of recommendations for future FTF programs.

Serve horticulture, tree crop, and dairy value chains. Continue to target high-value agricultural products to increase employment and incomes for the poor. Implement value-added strategies such as processed products and new product development and provide agro-processors and producer groups with the knowledge and skills to meet buyer requirements. Continue to help hosts differentiate their products and identify niche markets.

Focus on quality improvement and buyer standards. Quality improvement has played an important role in FTF hosts' success across the various focus areas. Promote GMP, HACCP, FDA, and USDA quality and sanitation standards. In addition, efficient farming practices and decreasing production and processing costs were effective strategies. In volatile agricultural markets, quality and production costs will continue to be the prevailing factors for maintaining and increasing value chain competitiveness. Developing market and sales strategies such as improved packaging and branding focused on penetrating formal markets through optimum client service and aggressive marketing.

Improve natural resource management The FTF Program should continue to promote sustainable natural resource management initiatives and increase the population's awareness about agriculture and water conservation techniques. Technical assistance in areas such as environmentally friendly food processing technologies, water and soil conservation, drip irrigation, and integrated pest management should continue.

Increase women's participation FTF should continue its emphasis on including women as participants and targeted clients in its programming activities. Each host country had specific opportunities to promote women's active involvement in agricultural and trade. LA FTF fielded numerous female volunteers to assist their counterparts in host countries to learn new production and business skills, which strengthened their ability and confidence to participate in decision-making and leadership roles.

Promote spread effect FTF should maximize the dissemination of its interventions through continued work with association/producer groups and agricultural education institutions, as well as facilitating agricultural producer forums. Continued collaboration with associations/producer groups will increase FTF's impact on a larger audience, as well as encourage members to share experiences. Continued collaboration with agricultural education institutions helps ensure the sustainability of interventions by transferring skills and knowledge to technicians, educators, and students.

Cooperate with partners FTF partnerships played an important role in generating positive outcomes from FTF interventions in targeted sectors. Although attribution of impacts is more difficult with this strategy, collaborative work helped each party (FTF, international/local project implementers, and donors) achieve their program objectives and facilitate concrete changes among targeted audiences.

Implement demonstration projects FTF should continue to support demonstration projects in cooperation with hosts and donors to show how innovative, low-cost technologies can increase productivity and profitability. Local partners and donors can provide funds for these demonstrations.

Improving Natural Resource Management – Water Conservation

Hydroponic Forage Demonstration Increases Milk Yields in the Dry Season

USAID’s John Ogonowski Farmer-to-Farmer Program brought a volunteer to El Salvador, at the request of Salvadoran agricultural extension agents, to teach water-saving hydroponic production techniques to farmers. The volunteer installed a pilot hydroponic forage system on one farm in Metapán, El Salvador.

During El Salvador’s dry season, fodder for dairy cattle is scarce. Between November and April, Salvadoran farmers do not have enough rain to grow grass in their fields, and many lack irrigation. Milk yields drop dramatically during this time of the year. By putting the plants under cover, in trays, the hydroponic system focuses all available moisture on the growing plants, and minimizes the loss through run-off and evaporation.

It took the volunteer and his group of farmers and extension agents a week to build the pilot facility. Growing hydroponic fodder uses over 90% less water than growing fodder in a field, according to researchers at Sandia National Labs, where this technology was perfected. It also uses a small land area compared to traditional pastures, which are often degraded and eroded from overgrazing. Once the low-cost structure is in place, the hydroponic fodder is cheap, costing only US\$0.09 - \$0.13 per pound to produce, compared with US\$0.30 for commercial fodder. In addition to using less water, the hydroponic system results in more productive cows. The farmer’s cows now average 15.4 bottles of milk each per day, 10% more than before. At US\$.30 cents per bottle, this farmer now earns an extra US\$200 each week.

Many Central American dairy farmers could benefit from this technology, which helps them use natural resources more efficiently. FTF’s local partner, TechnoServe, has already helped construct three more hydroponic forage systems, and obtained funding to construct another 20 systems
